

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of )  
 )  
Redevelopment of Spectrum to )  
Encourage Innovation in the )  
Use of New Telecommunications )  
Technologies )

ET Docket No. 92-9

To: The Commission

COMMENTS

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COMMENTS

Pursuant to Section 1.415 of the Commission's Rules, Alcatel Network Systems, Inc. ("ANS"), by its attorney, hereby submits its Comments on the above-captioned Notice of Proposed Rule Making, 7 FCC Rcd 1542 (1992) ("NPRM").<sup>1</sup>

I. SUMMARY

In the NPRM, the Federal Communications Commission ("Commission" or "FCC") proposes to reallocate 220 MHz of spectrum between 1.85 and 2.20 GHz for emerging telecommunications technologies. This proposed reallocation, however, will not come without a price.

A wholesale clearing of this 2 GHz band is contemplated. To make room for emerging technologies, the Commission, in the NPRM, proposes a phased-in migration of existing common carrier and private op-fixed 2 GHz microwave users to bands above 3 GHz and limits prospective fixed microwave users to operating at 2 GHz on a secondary basis.

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<sup>1</sup> The deadline for filing Comments in this proceeding was extended to June 8, 1992. Order Denying Request To Defer Comment Dates (DA 92-694, released June 4, 1992) ("Order").

Fixed private and common carrier microwave users provide crucial telecommunications services for local exchange carriers, cellular telephone companies, utilities, railroads, petroleum companies, financial institutions, and state and local governments. Essential public health and safety services depend upon the continuous reliable availability of these 2 GHz facilities.

In its determination to promote personal communications services ("PCS") and other emerging technologies, the Commission does not propose specific rules in the NPRM governing provision of service by the potentially displaced 2 GHz users in the bands above 3 GHz. Rules to ensure efficient use of the spectrum are forgotten. Requirements for the 2 GHz users' low and medium capacity systems in the primarily high capacity bands above 3 GHz are ignored.

Absent prudent consideration of these issues, it is impossible to determine whether the emerging technologies reallocation would serve the public interest. Regrettably, all the Commission does in the NPRM for 2 GHz users is propose a "blanket" waiver whereby they can relocate to "any of the higher frequency fixed microwave bands" under current coordination and channelization criteria.<sup>2</sup> Furthermore, this proposal is based upon assumptions and data compiled by the Commission's Office of Engineering and Technology ("OET"), which are highly questionable because OET exhibits only cursory knowledge of microwave fundamentals and microwave frequency planning practice.<sup>3</sup>

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<sup>2</sup> NPRM, 7 FCC Rcd at 1545.

<sup>3</sup> Creating New Technology Bands for Emerging Telecommunications Technology, Federal Communications Commission Office of Engineering and Technology, OET/TS 91-1 (December 1991) ("OET Study").

By failing to pay attention, in the NPRM, to the 2 GHz users' needs, the Commission has generated uncertainty regarding their operation above 3 GHz. In its effort to eliminate any "chilling effect on the incentives for manufacturers and financial institutions" interested in promoting emerging and unproven technologies,<sup>4</sup> the Commission instead creates a chilling effect on the microwave industry, which already has proven its worth. Such uncertainty is unnecessary.

ANS prefers the status quo. Common carrier and private fixed-op microwave users have served and continue to serve the public admirably from the 2 GHz band. There is no compelling reason presented by the Commission in the NPRM to create such havoc among these reliable 2 GHz users.

Convinced that the Commission, when left to its own devices, would continue ignoring the needs of 2 GHz users, ANS stepped into the breach left in the NPRM. Recognizing the problems created by the Commission's failure to propose how the evicted 2 GHz users would operate in the bands above 3 GHz, ANS took the initiative and submitted the missing rule proposals for public consideration. In a Petition for Rule Making, filed May 22, 1992 ("ANS Petition"), ANS proposes specific rules for co-primary use of all available bands by private op-fixed and common carriers, eligibility, band channelization, modulation efficiency standards and minimum channel loading requirements, minimum path length requirements, frequency coordination criteria, and antenna standards.<sup>5</sup>

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<sup>4</sup> NPRM, 7 FCC Rcd at 1543.

<sup>5</sup> The ANS Petition was placed on Public Notice for comment as RM-8004 (DA 92-705, released June 2, 1992).

ANS appreciates the Commission's prompt response to its Petition, which proposes the kinds of rules that should have been recommended in the NPRM. Indeed, ANS, in its Petition, does what the Commissioners themselves acknowledge is needed:

[We] will welcome particularly any additional proposals that might accommodate the competing demands for this important spectrum. Specifically, further notices of proposed rulemaking will be issued where necessary to address significant technical or operational issues raised in this docket....<sup>6</sup>

Predictably, controversy and criticism dominate public response to the NPRM. The Commission's decision to address the need for allocating spectrum to emerging technologies has been made in a vacuum. Corollary rules for displaced microwave users are not proposed and potential alternatives, such as allocation of adjacent federal government spectrum in the 1710-1850 MHz and 2200-2290 MHz bands, are not considered. These critical omissions have prompted several pleadings intended to arrest the drive to evict 2 GHz licensees.<sup>7</sup>

ANS also has provided an opportunity for the Commission to rehabilitate its approach to this 2 GHz reallocation by requesting the establishment of a single, coherent record to evaluate how to proceed. Concerned with the probability that these pleadings would create regulatory gridlock and would generate an inconsistent, incomplete and thus useless public record, ANS, on May 11, 1992, filed a Request to Defer Comment Dates

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<sup>6</sup> Letter from the Commissioners to Senator Ernest F. Hollings, dated April 20, 1992 ("Hollings Letter") at 1.

<sup>7</sup> On March 31, 1992, the Utilities Telecommunications Council ("UTC") filed a Petition for Rule Making (RM-7981) ("UTC Petition") requesting deferral of action on the NPRM until the Commission proposes rules for fixed microwave user operation above 3 GHz. On April 10, 1992, the Association of American Railroads ("AAR"), Large Public Power Council and the American Petroleum Institute collectively filed a Petition to Suspend Proceeding ("AAR Petition"), and on May 1, 1992, UTC filed a Petition for Issuance of Further Notice of Proposed Rulemaking ("UTC Further Petition").

("Request"). In the Request, ANS sought Commission deferral of comments on the UTC Petition, on the NPRM, on the ANS Petition, and on all other related pleadings. Such consolidation would place all relevant issues before the public for a single set of comments, would eliminate repetitive pleadings and related delays, and would facilitate the development of a more complete and useful record for the Commission.

Inexplicably, in the Order, the Chief Engineer denied the Request. Citing his concern that grant of the Request "would result in unwarranted delay," the Chief Engineer concluded that the public interest would be served by adhering to the existing pleading schedules.<sup>8</sup> The Chief Engineer's concern is misplaced. Grant of the Request would have expedited, rather than delayed, resolution of the proposed reallocation for emerging technologies.

## **II. ANS IS A WORLD LEADER IN PROVIDING TELECOMMUNICATIONS EQUIPMENT AND RELATED SERVICES**

ANS is a wholly-owned subsidiary of Alcatel Alsthom ("Alcatel"), one of the world's largest corporations (with annual sales in excess of \$30 billion) and the world's largest manufacturer and supplier of telecommunications equipment. In particular, Alcatel is the world's largest independent manufacturer and supplier of microwave telecommunications equipment, such as the equipment employed by the fixed users affected by the NPRM.

ANS was formed in 1991 following Alcatel's acquisition of Rockwell International Corporation's Network Transmission Systems Division ("NTSD"). In turn, NTSD was a successor to the Collins Radio Company, a pioneer in the development and production of microwave and other radio equipment. This organization, which started with eight employees in 1933, now employs approximately 5000 people in the United States. It has manufacturing facilities in Richardson and in Longview, Texas, Raleigh, North Carolina, and

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<sup>8</sup> Order at para. 5.

**Nogales, Mexico. These facilities contain over one million square feet of floor space devoted exclusively to the manufacture and test of digital lightwave and microwave radio transmission equipment. ANS has over \$500 million in annual sales.**

**ANS' expertise makes it well-suited to comment on the NPRM and to create, and advance before the Commission, the rules proposed in its Petition. It is a world leader in manufacturing microwave and lightwave transmission systems. Its parent company also lends expertise as a leader in the provision of cables, networks for broadband and narrowband services, satellite earth stations, and myriad data communications equipment. ANS' equipment is used for a wide range of services, including short, medium and long-haul voice, video and data transmissions. Its microwave customers include all the Bell Operating Companies, most major independent telephone companies, cellular operators, power and other utility companies, oil companies, railroads, industrial companies, and state and local government agencies.**

**ANS, with its Collins Radio and Rockwell International heritage, has more than 30 years experience as a leading U.S. supplier of turnkey telecommunications systems. This long and successful history at the forefront of radio technology includes the following:**

- **Providing the radio communication equipment for the Admiral Byrd expedition to the South Pole;**
- **Developing the first Class B radio modulation;**
- **Developing the first autotuning radio transmitters for nearly instantaneous frequency channel changes;**
- **Developing the first high frequency rotating direction finder;**
- **Developing the first weather radar system for a commercial television station;**

- Providing the high frequency transmitters for the State Department's Voice of America broadcasts;
- Developing the first radio sextant;
- Providing the high frequency communications equipment for the U.S. Air Force Strategic Air Command;
- Providing the communication/navigation system for the X-15 rocket plane;
- Providing the first two-way radio voice communication via artificial satellite (Project Echo);
- Providing all radio communication equipment for manned orbital flights (Project Mercury and Project Gemini);
- Being, at one time, the largest independent producer of data modems (Kineplex);
- Being a pioneer in the field of Tropospheric microwave communication;
- Manufacturing the first all-solid-state microwave radio to use a fundamental frequency above 1 GHz;
- Obtaining the first FCC type acceptance for a common carrier microwave transmitter; and
- Introducing the first all digital microwave radio capable of 1344 channels on one polarization.

With this experience and expertise, it is understandable why ANS' predecessor's equipment was used on Project Apollo to transmit the voice of the first man on the moon.

### **III. THE NPRM IS INCOMPLETE**

#### **A. TO ACCOMMODATE EMERGING TECHNOLOGIES, THE COMMISSION PROPOSES REALLOCATION OF THE 2 GHZ BAND**

Increasing interest in and demand for new radio communications service, domestically and abroad, is impeded by a corresponding shortage of available spectrum.

In recent years, technological advancements in digital and signal processing systems have opened possibilities for the development of a broad range of new radio communications services. These technological advances have increased the need for spectrum to foster the growth and development of new services, primarily for mobile applications. However, this has created an environment in which new services are vying with each other and with existing users for relatively small slivers of spectrum that are incapable of supporting full implementation of new service. The Commission currently has pending before it a number of requests for new services and technologies for which sufficient spectrum is unavailable.<sup>9</sup>

Afraid of being left behind in the wake of universal international PCS implementation, the Commission concludes that "it...is in the best interest of the United States to make spectrum available for the development of new services and technology."<sup>10</sup> To make this spectrum available, the Commission attempts to "strike a balance that will accommodate new technologies while ensuring that existing users can maintain and enhance the quality of their present operations."<sup>11</sup>

By only paying "lip service" in the NPRM to the 2 GHz licensees, the Commission destroys any chance for achieving this necessary balance. Notwithstanding the costs that making spectrum available might have on existing licensees or on public and private sector customers of these licensees, the Commission is intent on riding the PCS wave:

[T]he Commission has before it a significant number of requests for new services. New spectrum would permit the Commission to meet the needs of these services in an orderly manner. This spectrum would provide an available resource

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<sup>9</sup> NPRM, 7 FCC Rcd at 1542-43.

<sup>10</sup> NPRM, 7 FCC Rcd at 1543.

<sup>11</sup> Hollings Letter at 2.

that could be drawn upon for the implementation of new services and the expansion of existing services. The new technology band concept also would foster the development of new technology by providing clear guidance on future use of these frequencies. The current lack of available spectrum tends to have a chilling effect on the incentives for manufacturers and financial institutions to develop and fund new communications research. The emerging technologies bands would help provide some of the structure, in terms of frequency of operation and operating plan, that is needed to facilitate the development of equipment. At the same time, this new concept would provide considerable flexibility with regard to the types of technologies and services that can be authorized.

\* \* \* \* \*

Accordingly, we believe that the creation of emerging technologies bands would further the Commission's mandate to encourage the provision of new technologies and services to the public and encourage the larger and more effective use of radio in the public interest. Moreover, such action would complement our recent pioneer's preference rules intended to foster the development of new technologies and services.

\* \* \* \* \*

We recognize that establishment of bands for emerging technologies poses...difficult challenges.... There are substantial operations on virtually all of the lower frequency bands, so that establishment of emerging technologies bands will unavoidably necessitate relocation of significant numbers of existing users. The task, then, is to identify a relatively wide band of frequencies that can be made available with a minimum of impact on existing users and that also can provide suitable operating characteristics for new, primarily mobile services.<sup>12</sup>

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<sup>12</sup> NPRM, 7 FCC Rcd at 1543 (footnotes omitted).

Apparently, the Commission relies upon several general factors in arriving at its proposed reallocation of the 2 GHz band for emerging technologies:

**Cost of equipment** - If the spectrum chosen is in a range for which state-of-the-art equipment is not available, then high costs would delay the introduction of new services.

**Amount of spectrum** - There must be enough spectrum available to allow substantial development and economies of scale.

**Feasibility of relocation** - The existing licensees must be able to relocate with a minimum of cost and disruption of service to consumers.

**Non-government spectrum** - In order to avoid the need for coordination and to speed the process of transition, the new bands should come entirely from spectrum regulated by the FCC.

**International developments** - It is desirable for the spectrum chosen to be compatible with similar international developments. The WARC-92 most likely will focus on this spectrum for mobile use.<sup>13</sup>

Identification of the specific candidate bands for the displaced fixed microwave users is based upon the OET Study:

This study identified the most suitable region of the spectrum, determined the existing users of that spectrum, explored alternatives for relocating those users to higher bands or other media with a minimum disruption of service, and examined the cost of such relocation. The study concluded that 220 MHz in the 1.85-2.20 GHz region could be designated for innovative technologies and services.

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<sup>13</sup> NPRM, 7 FCC Rcd at 1543.

The study finds that the private and common carrier fixed microwave operations using this spectrum can be relocated to higher frequency bands that provide for similar type services and can support propagation over similar path lengths. Further, it observes that there are other reasonable alternatives for fixed microwave such as fiber, cable and satellite communications, which can utilize off-the-shelf equipment to provide these services.<sup>14</sup>

With respect to determining the technical feasibility of relocating the fixed microwave services operating in the 1.85-1.99 GHz, 2.11-2.15 GHz and 2.16-2.2 GHz bands to alternative bands above 3 GHz, OET examined spectrum: (1) that is allocated for fixed microwave operations; (2) that would be technically compatible (e.g., propagation and channel bandwidth) with existing 2 GHz systems; and (3) that would have sufficient spectrum capacity available to accommodate existing users.<sup>15</sup>

**B. THE COMMISSION PROPOSES A "BLANKET" WAIVER FOR FIXED MICROWAVE OPERATION ABOVE 3 GHZ**

Having embarked on its quest to make PCS and other new mobile technologies available to the public, the Commission sweeps the incumbent 2 GHz common carrier and private op-fixed users under the rug. Instead of fulfilling its statutory mandate to ensure that the potentially displaced 2 GHz users would have specific and appropriate rules governing their operation and that the bands above 3 GHz would be used efficiently, the Commission takes the easy way out.

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<sup>14</sup> NPRM, 7 FCC Rcd at 1543-44 (footnote omitted).

<sup>15</sup> OET Study, Sections 4.1 and 4.3.

To implement the migration of fixed microwave users off the 2 GHz band, the Commission merely proposes a

"blanket" waiver of the eligibility requirements in these bands for existing 2 GHz fixed microwave users. Specifically, we propose that all existing 2 GHz common carrier and private microwave operations be eligible for relocation to any of the higher frequency fixed microwave bands. The technical rules and coordination procedures currently applicable to each of the higher frequency bands, however, will apply. Existing 2 GHz fixed operations that relocate to the common carrier bands will be subject to the coordination procedures of Section 21.100 and 21.706, and those that relocate to private operational fixed bands will be subject to the coordination procedures of Section 94.63. We will encourage licensees moving from the 1.85-2.20 GHz band with path lengths of under 10 miles to reaccommodate their operations in frequency bands above 10 GHz to preserve the general availability of spectrum in the lower bands for longer path links not feasible at the higher frequencies.<sup>16</sup>

A transition plan is proposed to "reaccommodate the 2 GHz licensees in a manner that is the most advantageous for these existing users, least disruptive to the public and the most conducive to the introduction of new services."<sup>17</sup> This proposed transition plan involves: (a) immediately restricting applications for new fixed microwave facilities to secondary only use of the 2 GHz band; (b) allowing currently licensed 2 GHz fixed licensees to continue using the band on a co-primary basis for a fixed period of time (e.g., 10-15 years); and (3) permitting negotiation between existing users and new service operators for

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<sup>16</sup> NPRM, 7 FCC Rcd at 1545 (footnote omitted).

<sup>17</sup> NPRM, 7 FCC Rcd at 1545.

shared operation in the 2 GHz band and/or compensation for the displaced microwave user migrating to a band above 3 GHz.<sup>18</sup>

The Commission, in the NPRM, does not address the technical parameters needed to make this proposed migration from 2 GHz. Such necessary parameters are identified and proposed in the ANS Petition.

Beyond its proposed transition plan, the Commission solicits public comment on possible other approaches "that might lessen the impact on existing fixed microwave systems while ensuring the timely availability of 2 GHz frequencies for new services."<sup>19</sup> These approaches include (a) phased spectrum implementation; (b) indefinite co-primary allocation of the 2 GHz band for emerging technologies and for fixed microwave use; and (c) reallocation of adjacent federal government spectrum in the 1.71-1.85 GHz band.<sup>20</sup>

This proposed 2 GHz reallocation is based upon three (3) assumptions: (1) displaced fixed microwave users can operate at bands above 3 GHz under the "blanket" waiver without specific operating rules in place; (2) the bands above 3 GHz are appropriate because they have technical characteristics comparable to the 2 GHz band and because they provide sufficient capacity to accommodate the displaced fixed microwave users; and (3) alternative media exist for displaced fixed microwave users, such as fiber, cable, and satellite. As demonstrated below, the validity of these assumptions is questionable.

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<sup>18</sup> NPRM, 7 FCC Rcd at 1545. In a Public Notice (mimeo. no. 23115, released May 14, 1992), the Commission clarified and relaxed the restriction regarding modifications.

<sup>19</sup> NPRM, 7 FCC Rcd at 1546.

<sup>20</sup> NPRM, 7 FCC Rcd at 1546.

Considering the potential impact that the proposed 2 GHz reallocation will have on the fixed microwave users, these assumptions should not be used as the basis for decision-making of this magnitude. In the NPRM, the Commission does not provide the opportunity for a meaningful test of these assumptions to take place. Without specific proposed rules for fixed microwave operation in the bands above 3 GHz to evaluate, the public is unduly and severely handicapped in its ability to determine if the proposed 2 GHz reallocation is feasible.

1. Displaced 2 GHz users require specific operating rules.

One of the factors the Commission emphasizes in its proposed 2 GHz reallocation is that there "must be enough spectrum available to allow substantial development and economies of scale."<sup>21</sup> The Commission misses the mark by relying upon the amount of spectrum that would be available instead of prescribing rules to optimize efficient use of available spectrum.

On the other hand, ANS' proposals, in its Petition, are right on target. The critical issue in evaluating whether the bands above 3 GHz will be feasible for displaced 2 GHz users is how efficiently and effectively these bands would be used. As ANS proves in its Petition, adequate spectrum in the 3.6-3.7, 4, 6, 10 and 11 GHz bands would be available. Spectral efficiency, however, must be promoted. Low and medium capacity needs by displaced 2 GHz users must be accommodated in the high-capacity higher bands.<sup>22</sup>

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<sup>21</sup> NPRM, 7 FCC Rcd at 1543.

<sup>22</sup> ANS Petition, Attachment 1 at Section 1.0.

ANS' proposals satisfy this requirement by specifying a channelization plan that is sensitive to the needs of all fixed microwave users. Under ANS' proposal, the 3.6-3.7, 4, 6, 10 and 11 GHz bands all are channelized so that, for the first time, specific bands are available for low, medium or high capacity systems.<sup>23</sup>

In the NPRM, the Commission suggests that phased spectrum reallocation or open-ended co-primary allocation of the 2 GHz band for private sector users might be alternatives for accommodating 2 GHz users and emerging technologies.<sup>24</sup> ANS supports comprehensive evaluation of these approaches, provided the needs of the low and medium capacity 2 GHz users are met without compromising spectral efficiency.

In its Petition, ANS proposes phased-in implementation of spectrum reallocation. For example, to avoid disruption of existing satellite services, ANS proposes a phased-in reallocation of the 40 MHz at each edge of the 4 GHz band for primary fixed use.<sup>25</sup>

With respect to open-ended co-primary use, such an approach has significant limitations that must be resolved before it could be implemented. This technical issue was addressed in considerable detail by the Telecommunications Industry Association ("TIA"). The TIA strongly opposes the operation of wide-band spread spectrum systems in the same RF channel and geographical area as existing microwave systems.<sup>26</sup> Due to the

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<sup>23</sup> ANS Petition at 15.

<sup>24</sup> NPRM, 7 FCC Rcd at 1546.

<sup>25</sup> ANS Petition at 19.

<sup>26</sup> See Reply Comments of the Network Equipment Division of TIA in the Matter of the Amendment of the Commission's Rules to Establish New Personal Communications Services, January 7, 1992.

uncontrolled nature of such systems, existing microwave systems will receive unacceptable levels of interference causing unpredictable service interruptions.

2. The OET Study does not demonstrate that the bands above 3 GHz are appropriate for displaced 2 GHz users.

The OET Study, by its authors' admission, is limited in scope:

The methodology and analyses used in the study were intended to provide only broad measures of relocation capacity and were not designed to provide a relocation scheme for specific individual facilities.<sup>27</sup>

Moreover, the "specific aspects of individual facility operations, such as actual channel bandwidths, were not considered."<sup>28</sup>

OET anoints the 3.7-4.2 GHz, 5.925-6.425 GHz and 6.525-6.875 GHz bands as "candidate relocation bands for the existing 2 GHz users."<sup>29</sup> This selection is made in large part because OET concludes that existing usage levels in the 4 and 6 GHz bands, nationally and in the top 50 Metropolitan Statistical Areas ("MSAs"), provide sufficient capacity for the relocated 2 GHz users, based upon their existing usage levels.<sup>30</sup>

As detailed below, this conclusion is reached without supporting documentation and is based upon unprecedented and flawed methodologies. Under these circumstances, until these shortcomings are remedied with the benefit of comments on the NPRM and on the

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<sup>27</sup> OET Study, Section 4.2.

<sup>28</sup> OET Study, note 19.

<sup>29</sup> OET Study, Executive Summary at 1.

<sup>30</sup> OET Study, Section 4.4.

ANS Petition, the Commission cannot proceed with the proposed 2 GHz reallocation for emerging technologies.

(a) Data used for OET Study -- OET claims that it conducted

[c]omprehensive and detailed analyses...to determine the number of licensees, the number of facilities or transmitters, the location of the facilities, the technical operating parameters of the facilities, and the communications requirements of existing licensees in [the 2 GHz] band.<sup>31</sup>

The data for these analyses were obtained from the Commission's XFS database, which was the "primary informational source" for the OET Study.<sup>32</sup> Information from several common carriers and other companies was used to update and verify the records contained in the XFS database.<sup>33</sup>

As a threshold concern, the validity of the data obtained from these sources is questionable. OET acknowledges that the current XFS database "might be unreliable in a number of areas."<sup>34</sup> No information is provided to demonstrate how this unreliability was minimized or impacted by the records obtained from the common carriers or other sources. Thus, it is impossible to replicate OET's study, let alone independently test its accuracy.

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<sup>31</sup> OET Study, Section 3.3.

<sup>32</sup> OET Study, Section 3.3.

<sup>33</sup> OET Study, Section 3.3.

<sup>34</sup> OET Study, Section 3.3.

(b) OET's selection of the 2 GHz band for emerging technologies -- In selecting the 2 GHz band for reallocation to emerging technologies, OET purports to have considered other bands as potential candidates. Such bands include 1.99-2.11, 2.11-2.13, 2.15-2.16 and 2.16-2.18 GHz.<sup>35</sup>

OET rejects these bands for several reasons. These reasons include the unavailability of PCS and other equipment for bands above 3 GHz and the expected usage levels on those candidate bands. The bases for these conclusions are unjustified and thus must be reexamined before a final decision on reallocating the 2 GHz band for emerging technologies is made.

First, OET's claim regarding the unavailability of state-of-the-art PCS-related equipment for bands above 3 GHz is untrue. For example, in mid-1991, AT&T applied to the Commission for permission to conduct a three-year experimental program in the 6 GHz band.<sup>36</sup> This plan includes the development of both base stations and lightweight handsets.

Second, OET fails to justify its rejection of the alternative bands. These "bridesmaid" bands do not deserve such perfunctory treatment. In its Further Petition, UTC makes a convincing showing that such non-government bands are viable candidates for emerging technology allocation.<sup>37</sup> ANS supports further definitive study of these bands before the 2 GHz reallocation is adopted.

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<sup>35</sup> OET Study, Section 3.3.

<sup>36</sup> See AT&T Technology, Vol. 6, No. 4 (1991).

<sup>37</sup> A similar convincing showing regarding government spectrum is made in the AAR Petition.

(c) OET's capacity analysis -- Appropriately, OET investigates whether 2 GHz users would have adequate capacity on the bands above 3 GHz to support their operations.

OET makes this determination by studying:

- 1) the number of facilities to be relocated; 2) the location of those facilities; and 3) the capacity available in the relocation spectrum at that location.<sup>38</sup>

This profile is derived by overlaying a grid, consisting of one degree zones or blocks on the entire country and consisting of two degree zones on the top 50 MSAs, and counting the number of transmitters operating at 2 GHz, 4 GHz and 6 GHz contained in each such zone.<sup>39</sup> OET then estimates the maximum capacity in each block by examining the zones with the highest number of transmitters and assuming that, in general, this is the number or "benchmark" that should be achievable in any location.<sup>40</sup> The available excess capacity in the 4 and 6 GHz bands is the difference between the benchmark and the number of facilities operating in that band.<sup>41</sup>

From this study, OET concludes that the density of 2 GHz, 4 GHz and 6 GHz microwave facilities is only moderate to light in the vast majority of the country.<sup>42</sup> Moreover, OET concludes that, based upon this existing usage data, "it appears that the 4

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<sup>38</sup> OET Study, Section 4.4.

<sup>39</sup> OET Study, Section 4.4.

<sup>40</sup> OET Study, Section 4.4.3.

<sup>41</sup> OET Study, Section 4.4.3.

<sup>42</sup> OET Study, Sections 4.4.1 and 4.4.2.

and 6 GHz bands are capable of fully accommodating the relocation of the 2 GHz transmitters."<sup>43</sup>

OET's methodology is novel and misleading. Capacity analysis was made on the basis of one degree squares (sixty mile side squares) for lightly populated areas and two degree squares (120 mile side squares) for the 50 most populated MSAs. Arbitrary capacity limits for these analysis squares were used.

The validity of this approach is not clear. A critical flaw in OET's approach is that it treats all cities the same. Population distribution and terrain factors are ignored.

For example, New York and Phoenix are assumed to be the same for purposes of microwave usage levels. This is like comparing apples and oranges. With respect to population distribution, New York is probably the most homogeneous city in the country for designing a microwave network. In contrast, Phoenix is quite heterogeneous because it is characterized by a dense urban area and by sparsely populated outlying areas.

The results at 6 GHz are also questionable. OET concludes that the lower 6 GHz paths in San Francisco are only half used and those in Los Angeles are only three quarters used.<sup>44</sup> However, these cities are characterized by terrain constraints not present in other cities. The authors of the OET Study should attempt to frequency plan a path in San Francisco or Los Angeles and then reassess their methodology.

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<sup>43</sup> OET Study, Section 4.4.3.

<sup>44</sup> OET Study, Section 4.4.4.

OET's approach would have been more meaningful had a few trial cities been used (as was done in the ANS Petition)<sup>45</sup> to test its validity. Inexplicably, OET wants the public to conclude that treating a city as a 120 mile square block of land is appropriate.

This is a flawed methodology. Very dense cities, like Los Angeles and San Francisco, have desert or low population areas within sixty miles of the city center. The cities themselves are quite dense. If paths in the desert or agricultural areas are useful, there is spare path capacity. If urban paths are needed (which is typically the case), the cities are choked. Thus, while the underlying error may be in the XFS database, the OET Study is biased because of OET's reliance upon the grid methodology.

Frequency planning and path design never have been done on this basis. Careful consideration must be given to each individual case. OET arrives at conclusions which any experienced path designer knows are not true. Thus, in many cases, the results in the OET Study make no sense.

The OET Study is further impeached because OET ignores the problems associated with coordinating fixed microwave user operations with common carrier operations in the 4 GHz band. As ANS addressed in its Petition, this problem limits the available capacity of the 4 GHz band significantly.<sup>46</sup>

The 4 GHz band is attractive for long distance, high reliability paths. It has radio propagation characteristics similar to the 2 GHz band. However, certain issues involving coordination with incumbent satellite users must be resolved before significant new point-to-point users may be introduced into this band.

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<sup>45</sup> ANS Petition, Attachment 1 at Section 3.0.

<sup>46</sup> ANS Petition, Attachment 1 at Section 3.3.

First, a large number of licensed satellite earth stations have been installed over the years around existing 4 GHz microwave systems. Since the earth stations are much more susceptible to interference than terrestrial microwave, it is almost impossible to coordinate new 4 GHz paths in many urban areas. Even in rural areas, the frequency coordination process can be expensive since it may require on-site inspections of earth stations and field measurements to determine local shielding. Most existing 4 GHz paths were installed years ago, before earth stations became widespread.

The second problem with the 4 GHz band involves unlicensed receive-only earth stations. A substantial number of these earth stations have been installed in urban and rural areas across the country. Although technically these systems are not protected against interference, their owners have invested considerable sums in installations and are vocal when reception is impaired. These earth stations also are providing a needed public service, delivering television to areas inadequately served by conventional broadcasters and cable systems. Moreover, since unlicensed earth station owners are telephone customers, common carriers are reluctant to interfere with these systems if possible. As a result, common carriers prefer to use other frequency bands instead.

OET's capacity analysis is further undercut by its being limited to data on existing usage levels.<sup>47</sup> OET completely ignores new users. To obtain a meaningful assessment of capacity in the bands above 3 GHz for displaced 2 GHz users, OET must address existing demand levels and it must make reasonable estimates of fixed microwave users' spectrum needs for the next 10-15 years. Otherwise, efficient use of the spectrum will be impossible.

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<sup>47</sup> OET Study, Section 4.4.

In summarizing its findings, OET makes several telltale confessions regarding the Study. First, OET characterizes the Study as an "approximate" analysis.<sup>48</sup> Second, OET concludes that "it appears that there is generally sufficient capacity in the 4 GHz and 6 GHz bands to accommodate the existing 2 GHz FS facilities nationwide."<sup>49</sup> Third, OET opines that "[a]dditional relocation capacity appears to be available in the 10 GHz, 12 GHz and 18 GHz fixed microwave bands for short and medium path lengths."<sup>50</sup>

From these equivocal and highly qualified conclusions, OET somehow manages to "support[ ] the establishment of several emerging technologies bands by relocating the existing 2 GHz FS operations to alternative media or to spectrum above 3 GHz."<sup>51</sup> While ANS applauds OET's effort, it rejects its execution. For the reasons set forth above, the OET Study is incomplete, riddled with flaws, and thus unacceptable as a predicate for the reallocation of the 2 GHz band to emerging technologies, as proposed by the Commission in the NPRM.

3. Fiber, satellite and cable media are not viable alternatives for fixed microwave users.

Availability of alternate media for displaced 2 GHz fixed microwave users is also an essential ingredient in the Commission's proposal. Based upon the OET Study, the Commission notes that "other reasonable alternatives for fixed microwave such as fiber,

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<sup>48</sup> OET Study, Section 4.5.

<sup>49</sup> OET Study, Section 4.5 (emphasis added).

<sup>50</sup> OET Study, Section 4.5 (emphasis added).

<sup>51</sup> OET Study, Section 4.5.